We would like to respectfully acknowledge the Dharug people, the traditional custodians of the land on which this meeting takes place, and also pay respect to Elders both past and present.

We would also like to pay our respects to the Indigenous men and women who have contributed to the defence of Australia in times of peace and war.
Welcome

Session outline:

- Background
- Human Health Risk Assessment Findings
- Ecological Risk Assessment Findings
- Next steps
  - PFAS Management Area Plan
- Further information and questions
PFAS Investigation and Management Program

Widely used around the world to make products that resist heat, stains, grease and water.

Used in legacy firefighting foam to extinguish liquid fuel fires by both civilian and military authorities.

Most people in developed countries are likely to have levels of PFAS in their blood.

PFAS of concern:
- Perfluorooctane sulfonate (PFOS)
- Perfluorooctanoic acid (PFOA)
- Perfluorohexane sulfonate (PFHxS)
PFAS was used in legacy firefighting foam to extinguish liquid fuel fires by both civilian and military authorities.

Defence and other users became aware that PFOS/PFOA was an emerging persistent organic pollutant.

Defence introduced a new foam and commenced phasing out use of the old foams for both training and emergencies.
In 2010, Defence commenced the first PFAS environmental investigation in Oakey.

In 2015 the PFAS Investigation and Management Program commenced.

Defence has commenced 27 detailed environmental investigations, nine of which have now been completed and transitioned to management sites.
Health Advice

“*There is currently no consistent evidence that exposure to PFOS and PFOA causes adverse human health effects. Because these chemicals persist in humans and the environment, enHealth recommends that human exposure to these chemicals is minimised as a precaution.*”

The Environmental Health Standing Committee (enHealth)

- Defence relies on the advice of Australian health authorities.
- In May 2018, enHealth’s advice was reaffirmed by an independent Expert Health Panel which was established by the Department of Health.
Investigation Status

• Defence has completed the detailed environmental investigation into PFAS for RAAF Base Richmond. This has included:
  ▪ A Preliminary Site Investigation,
  ▪ A Detailed Site Investigation, and
  ▪ The Human Health and Ecological Risk Assessments.

• The outcomes of the investigations are being used to develop a PFAS Management Area Plan.
Human Health Risk Assessment
The aim of the HHRA is to better understand potential risk of exposure to PFAS.

<table>
<thead>
<tr>
<th>SAMPLE TYPE</th>
<th>SAMPLES COLLECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
<td>103</td>
</tr>
<tr>
<td>Groundwater</td>
<td>36</td>
</tr>
<tr>
<td>Surface water</td>
<td>57</td>
</tr>
<tr>
<td>Sediment</td>
<td>36</td>
</tr>
<tr>
<td>Biota, including fish, poultry eggs, fruit, vegetables and grass (fodder)</td>
<td>76</td>
</tr>
<tr>
<td><strong>Total samples collected</strong></td>
<td><strong>308</strong></td>
</tr>
</tbody>
</table>
## Human Health Risk Assessment: Key Findings

### Assessed Exposure Risk

<table>
<thead>
<tr>
<th>Low and acceptable exposure risk</th>
<th>Potentially elevated exposure risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unintentionally ingesting, touching or inhaling dust from soil, during outdoor activities.</td>
<td>People who live in the Study Area and eat large quantities of finfish caught from local waterways and, either home-grown eggs or home-grown red meat.</td>
</tr>
<tr>
<td>Inhaling dust from soil tracked back into the home.</td>
<td>People who live in the Study Area and eat a large proportion of home-grown eggs from poultry, which eat soil or drink water containing detectable PFAS.</td>
</tr>
<tr>
<td>Unintentionally ingesting or skin contact with water, during outdoor agricultural or horticultural use, maintenance activities or recreational activities.</td>
<td>People who live in the Study Area and eat a large proportion of home-grown red meat from cattle, which drink water containing detectable PFAS from Bakers Lagoon and surrounding surface water networks.</td>
</tr>
<tr>
<td>Unintentionally ingesting or skin contact with sediment, during outdoor activities.</td>
<td>Eating finfish from local waterways (e.g. the Hawkesbury River) by recreational fishers who do not live in the HHRA Study Area.</td>
</tr>
<tr>
<td>Eating home-grown green vegetables irrigated with water containing detectable PFAS, or that have been grown in soil that has been irrigated, or flooded with water containing detectable PFAS.</td>
<td></td>
</tr>
</tbody>
</table>

- **Low and acceptable exposure risk**
  - Unintentionally ingesting, touching or inhaling dust from soil, during outdoor activities.
  - Inhaling dust from soil tracked back into the home.
  - Unintentionally ingesting or skin contact with water, during outdoor agricultural or horticultural use, maintenance activities or recreational activities.
  - Unintentionally ingesting or skin contact with sediment, during outdoor activities.
  - Eating home-grown green vegetables irrigated with water containing detectable PFAS, or that have been grown in soil that has been irrigated, or flooded with water containing detectable PFAS.
  - Eating finfish from local waterways (e.g. the Hawkesbury River) by recreational fishers who do not live in the HHRA Study Area.

- **Potentially elevated exposure risk**
  - People who live in the Study Area and eat large quantities of finfish caught from local waterways and, either home-grown eggs or home-grown red meat.
  - People who live in the Study Area and eat a large proportion of home-grown eggs from poultry, which eat soil or drink water containing detectable PFAS.
  - People who live in the Study Area and eat a large proportion of home-grown red meat from cattle, which drink water containing detectable PFAS from Bakers Lagoon and surrounding surface water networks.
Ecological Risk Assessment
Ecological Risk Assessment: Objectives

The objectives of the Ecological Risk Assessment (ERA) were to assess the potential:

- Exposure risks to ‘ecological receptors’ (land and water-based animals and plants) from direct exposure to PFAS within the Study Area.

- Indirect exposure risks, through the food chain, to ‘higher order organisms’, from PFAS bioaccumulation in land and water-based animals within the Study Area.
# Ecological Risk Assessment: Sampling

<table>
<thead>
<tr>
<th>SAMPLE TYPE</th>
<th>SAMPLES COLLECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface water</td>
<td>93</td>
</tr>
<tr>
<td>Soil</td>
<td>60</td>
</tr>
<tr>
<td>Sediment</td>
<td>70</td>
</tr>
<tr>
<td>Groundwater</td>
<td>6</td>
</tr>
<tr>
<td>Terrestrial and aquatic biota (land and water based animals and plants)</td>
<td>57</td>
</tr>
<tr>
<td><strong>Total samples collected</strong></td>
<td><strong>286</strong></td>
</tr>
</tbody>
</table>
Ecological Risk Assessment: Key Findings

The ERA indicates that there is potential for elevated risks to plants and animals within the Study Area.

This is because of:

• Discharge of PFAS impacted surface water from the Base’s airfield foam cannon testing area and Sewage Treatment Plant (STP);

• Discharge of PFAS impacted surface water from the Base and Rickabys Drop Zone to Rickabys Creek;

• Discharge of PFAS impacted surface water from the STP on the Base and Rickabys Drop Zone, through an underground pipe to Bakers Lagoon; and

• The bioaccumulation of PFAS in water and land-based animals.
# Ecological Risk Assessment: Key Findings

<table>
<thead>
<tr>
<th>Animal Group</th>
<th>The Base and Rickabys Drop Zone</th>
<th>Bakers Lagoon</th>
<th>Hawkesbury River</th>
<th>Remaining Locations in the Study Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Terrestrial invertebrates</strong> (Land-based animals e.g. worms and insects)</td>
<td>!</td>
<td>!</td>
<td>N/A</td>
<td>!</td>
</tr>
<tr>
<td><strong>Terrestrial plants</strong> (Land-based plants)</td>
<td>!</td>
<td>!</td>
<td>N/A</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Aquatic invertebrates</strong> (Water-based animals e.g. insects and worms that live in the water)</td>
<td>!</td>
<td>!</td>
<td>!</td>
<td>!</td>
</tr>
<tr>
<td><strong>Fish</strong></td>
<td>!</td>
<td>!</td>
<td>!</td>
<td>!</td>
</tr>
<tr>
<td><strong>Herbivorous terrestrial mammals</strong> (Land-based mammals that eat plants)</td>
<td>!</td>
<td>!</td>
<td>N/A</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Herbivorous terrestrial birds</strong> (Land-based birds that eat plants)</td>
<td>!</td>
<td>✓</td>
<td>N/A</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Invertivorous / omnivorous mammals</strong> (Mammals that eat plants and animals)</td>
<td>!</td>
<td>✓</td>
<td>N/A</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Invertivorous / omnivorous birds</strong> (Birds that eat plants and animals)</td>
<td>!</td>
<td>!</td>
<td>N/A</td>
<td>!</td>
</tr>
<tr>
<td><strong>Predatory terrestrial mammals</strong> (Land-based predatory mammals)</td>
<td>!</td>
<td>!</td>
<td>N/A</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Predatory terrestrial reptiles</strong> (Land-based predatory reptiles)</td>
<td>!</td>
<td>!</td>
<td>N/A</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Predatory terrestrial birds</strong> (Land-based predatory birds)</td>
<td>!</td>
<td>!</td>
<td>N/A</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Invertivorous / omnivorous aquatic birds</strong> (Water-based birds that eat plants and animals)</td>
<td>!</td>
<td>!</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Invertivorous / omnivorous aquatic reptiles</strong> (Water-based reptiles that eat plants and animals)</td>
<td>!</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Piscivorous aquatic birds</strong> (Water-based fish eating birds)</td>
<td>!</td>
<td>!</td>
<td>✓</td>
<td>!</td>
</tr>
</tbody>
</table>

- ✓ = minimal or low and acceptable risk
- ! = potential elevated risk
- N/A = Not applicable
Next Steps
PFAS Management Area Plan (PMAP)

Aim:
• To manage, monitor and reduce the risks of PFAS exposure and/or migration as a result of Defence’s activities

Plan considerations:
The development of the PMAP considers:
• Key source areas
• Exposure Risks
• Pathways
• Available treatment technologies
Ongoing Monitoring Plan

As part of the PMAP, an Ongoing Monitoring Plan (OMP) is being prepared to provide information on changes in the location and concentrations of PFAS originating from the Base.

The purpose of the OMP is to provide:

• An evidence base for ongoing risk management of PFAS contamination;

• Indications of trends in PFAS concentrations to assist evaluate the progress of management measures, and identify if additional management measures are required; and

• Evidence to support further refinement of the conceptual site model.

The PMAP and OMP are expected to be completed in early 2019.
Stakeholder and Community Engagement

- Website
- Information Line
- Factsheets & Newsletters
- Advertisements & Flyers
- Individual Correspondence
- Community Information Sessions
Questions

Thank you

Contact us

- richmond.defence@aecom.com
- 1800 789 291 freecall (business hours)